Artificial Democratic Life. Re-engineering the autonomy of the social, a research program

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Abstract

By *Artificial Democratic Life* we mean the design and deployment of artificial (digital) infrastructures aimed at enhancing or improving social democratic life. Artificial Life, as a discipline and as a community, has much to contribute to the contemporary challenge of redesigning democracy in the network era, in understanding and designing democracy as a form of life: one that evolves into increasingly higher complexity and diversity while preserving homeostatic invariants and designing the infrastructures capable to resiliently enhance it. We identify some opportunities and specific challenges that can be faced using Alife simulation techniques and conceptual resources.

Introduction: democracy and the living

New constraints and opportunities often give rise to the emergence of new forms of life or their radical transformation. Such is the case of the emergence of administrative institutions with the invention of writing, the emergence and autonomization of economic life with capitalism or that of academic life through meetings, letters and journals and, more recently, the internet. This last infrastructure, the internet, has made possible a profound transformation of many human and societal forms of life. And democracy is waiting its turn. In the era of Artificial Intelligence and Algorithmic Governance the issue of how to build public digital infrastructures for democratic life becomes a design challenge that can greatly benefit from Alife simulation techniques and conceptual resources.

The conceptual relationships that researchers have established between living phenomena and democracy are many. At the most abstract level "causal democracy" has been vindicated as a model for understanding developmental and living phenomena (Oyama, 2000), at the molecular level cellular transcription networks have been characterized as democratic dynamics (Bar-Yam et al., 2009), collective behaviour is often characterized using democracy related terms like "quorum" sensing and "consensus" in bacteria (Miller and Bassler, 2001) or directly as "democracy" in honey-bees (Seeley, 2010). In turn, concept such as that of neuronal-assemblies (Varela, 1995) or dendritic democracy (Husser, 2001) have been widely used, and as early as in 1941 Sherrington declared the nervous system to be "a million-fold democracy whose each unit is a cell" (Sherrington, 1941). More generally, the concepts of "self-organization" and "autonomy" have been central to the characterizations of the living, strongly associated with notions of self-governance, self-rule-making (Kauffman, 1993; Varela, 1979). Artificial Life models have played a very important role on the modelling and conceptualization of how patterns of life can emerge out of decentralized and self-organized processes (Bedau, 2003), that is, understanding how living patterns are democratic-like. It is time to seek out how Artificial Life can inform and improve Democracy.

Artificial constitution of democratic societies

Our societies are not anymore a collection of rational agents, individually or collectively acting according to specific cognitive strategies with a mere instrumental relationship to artifacts. The french sociologist Bruno Latour (2005) challenges us to conceive of societies as actor-networks where cars, mobiles or pencils operate, interconnected with humans, all creating the collective network of interactions we call "society". The increasing mediation of digital devices in our social life makes this artificial constitution of society the more apparent and the design of social interfaces has become the primary mode of social production (Yaneva, 2009).

Decentralized Autonomous Organizations as defined by smart contracts running over blockchain technologies (like Ethereum) (DuPont, 2017) or new direct participatory democracy platforms like Decidim.org (Barandiaran et al., 2017, 2019) (currently in use in hundreds of cities) are but two examples of how new technologies are boosting democratic life. But they face multiple design challenges to deliver the experience of effective and complex democracy they aim to make possible.

Artificial Democratic Life: the very idea

Following Bedau (2003) the goals of Artificial Life "include modelling and even creating life and life-like systems, as well as developing practical applications using intuitions

and methods taken from living systems." If we now consider democracy as a form of (political) life we can envision the very idea of *Artificial Democratic Life* as the design and deployment of artificial infrastructures aimed at enhancing or improving social democratic life understood as a decentralized, egalitarian, and participatory decision making and commitment generating system of interactions.

Some open challenges that Artificial Democratic Life could help with include:

- *Equilibrium between the satisfaction of multiple interests.* Designing mechanisms for decision making that maximize the satisfaction of a maximum number of citizens. For an example see the work of Fain et al. (2016)

- *Facilitation of complex growth patterns in communicative discourse.* Designing deliberative mechanism (e.g. nested comments in a forum) that improve deliberative depth, quality and effectiveness. For an example see the work of Aragon et al. (2017)

- *Effective distribution of relevant information for decision making.* Designing collaborative moderation systems to channel relevant information into front pages or personalized profile feeds. For an example see the work of Mills and Fish (2015)

- *Ecological efficiency and diversity preservation in communication networks.* Designing algorithms for suggesting connectivity patterns between social network participant in order to improve diversity, robustness and communication efficiency.

Life have solved variants of these problems at different scales. And Alife has played a central role understanding and modelling them. Discovering and designing democracy as a form of life involves moving beyond its understanding as a complicated optimization problem, a statistical mass effect, a mere complex system or a political representational function of social cognition. Artificial Life should help understand democracy as a form of social life, with its potential for self-organization, its capacity to evolve into increasingly higher complexity, to homeostatically adapt to new circumstances preserving equity and to embody intelligence in a distributed social body.

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References

Aragon, P., Kaltenbrunner, A., Calleja-Lopez, A., Pereira, A., Monterde, A., Barandiaran, X. E., and Gmez, V. (2017). Deliberative Platform Design: The Case Study of the Online Discussions in Decidim Barcelona. In *Social Informatics*, Lecture Notes in Computer Science, pages 277–287. Springer, Cham.

Bar-Yam, Y., Harmon, D., and de Bivort, B. (2009). Attractors and Democratic Dynamics. *Science*, 323(5917):1016–1017.

Barandiaran, X., Calleja, A., Monterde, A., Aragn, P., Linares, J., Romero, C., and Pereira, A. (2017). Decidim: redes polticas y tecnopolticas para la democracia en red. *Recerca. Revista de pensament i anlisi.*, (21):137–150.

Barandiaran, X. E., Calleja-Lopez, A., and Monterde, A. (2019). Decidim: political and technopolitical networks for participatory democracy. *White Paper*, https://docs.decidim.org/whitepaper/en/doc-info/.

Bedau, M. A. (2003). Artificial life: organization, adaptation and complexity from the bottom up. *Trends in Cognitive Sciences*, 7(11):505–512.

DuPont, Q. (2017). Experiments in algorithmic governance. A history and ethnography of The DAO, a failed decentralized autonomous organization. In Campbell-Verduyn, M., editor, *Bitcoin and Beyond: Cryptocurrencies, Blockchains, and Global Governance*, pages 157–178. Routledge, 1 edition.

Fain, B., Goel, A., and Munagala, K. (2016). The Core of the Participatory Budgeting Problem. In Cai, Y. and Vetta, A., editors, *Web and Internet Economics*, Lecture Notes in Computer Science, pages 384–399. Springer Berlin Heidelberg.

Husser, M. (2001). Synaptic function: Dendritic democracy. *Current Biology*, 11(1):R10–R12.

Kauffman, S. A. (1993). *The origins of order*. Oxford University Press US.

Latour, B. (2005). *Reassembling the social: an introduction to actor-network-theory*. Clarendon lectures in management studies. Oxford University Press, Oxford ; New York. OCLC: ocm58054359.

Miller, M. B. and Bassler, B. L. (2001). Quorum Sensing in Bacteria. *Annual Review of Microbiology*, 55(1):165–199.

Mills, R. and Fish, A. (2015). A Computational Study of How and Why reddit.com was an Effective Platform in the Campaign Against SOPA. In Meiselwitz, G., editor, *Social Computing and Social Media*, Lecture Notes in Computer Science, pages 229–241. Springer International Publishing.

Oyama, S. (2000). *The ontogeny of information*. Duke University Press.

Seeley, T. D. (2010). *Honeybee Democracy*. Princeton University Press. Google-Books-ID: txMkdG9G5acC.

Sherrington, C. S. (1941). *Man on his Nature*. Macmillan, Oxford, England.

Varela, F. J. (1979). *Principles of biological autonomy*. English. North Holland, New York.

Varela, F. J. (1995). Resonant cell assemblies: a new approach to cognitive functions and neuronal synchrony. *Biological Research*, 28(1):81–95.

Yaneva, A. (2009). Making the Social Hold: Towards an Actor-Network Theory of Design. *Design and Culture*, 1(3):273–288.